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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,280	06/28/2002	Joanna L. Duncan	AL.US.13	2709

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MESMER & DELEAULT, PLLC
1 NEW HAMPSHIRE AVE.
SUITE 125
PORTSMOUTH, NH 03801

EXAMINER	
LISH, PETER J	

ART UNIT	PAPER NUMBER
1754	

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,280	DUNCAN ET AL.	
	Examiner	Art Unit	
	Peter J. Lish	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 September 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) *24-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,7-15 and 19-23* is/are rejected.

7)☒ Claim(s) *3-6, and 16-18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/20/02, 9/23/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-23, drawn to a method of removing oxides from a gas stream, classified in class 423, subclass 243.11.

II. Claims 24-38, drawn to an apparatus comprising electrical discharge, classified in class 422, subclass 186.04.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used to practice another and materially different process, such as the sterilization of medical equipment.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Phil Decker on September 7th, 2005, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-23. Affirmation of this election must be made by applicant in replying to this Office action. Claims

24-38 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claim 23 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim1 of U.S. Patent No. 6,936,231. Although the conflicting claims are not identical, they are not patentably distinct from each other because one cannot perform the process of US '231, without at the same time performing the process of the present claim 23.

Claim 23 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim1 and 10 of copending Application No. 10/707,340. Although the conflicting claims are not identical, they are not patentably distinct from each other because one cannot perform the process of 10/707,340, without at the same time performing the process of the present claim 23.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 7-10, 14, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skelley et al. (US 5,316,737).

Skelley et al. teaches a process for the removal of sulfur oxides and nitrogen oxides from an exhaust gas. The process comprises oxidizing the gases with ozone to form higher orders of NO_x and SO_x, such as for example converting NO to NO_2. The gases are then sent to a scrubber/absorption chamber where they are contacted with sodium hydroxide. Finally, the gases are sent through a demister to remove any aerosols and released out of the stack.

While the pH of the scrubbing solution of Skelley et al. is not explicitly taught, it is expected that it have a pH of greater than six because it is produced from a concentrated solution of sodium hydroxide, which is known to yield solutions of high pH. Moreover, control of the pH of the solution is taught. Where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). Additionally, it would have been obvious to one of ordinary skill at the time of invention to use a sodium hydroxide solution of high pH in order to effectively neutralize the acidic components of the gas.

Regarding claims 9 and 20, it is taught that the scrubbing solution be recirculated; therefore it is inherent that it contains alkali sulfites and alkali sulfates, as they are known to be produced upon contact with the oxidized sulfur-containing components of the gas.

Regarding claims 7-8, Skelley et al. does not explicitly teach the ratio of SO_2 to NO_2 present after oxidation. However, it is expected that the process of Skelley et al. may be performed so as to have different oxidizing potentials, i.e. performing oxidation for different lengths of time, and that the gases treated by the process of Skelley et al. may vary in their SO_x to NO_x ratios. Therefore, while Skelley et al. does not explicitly teach the gas concentrations after the oxidation reaction, where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594

(CCPA 1980). Furthermore, it is known that exhaust gas may contain a significantly higher amount of sulfur oxides than nitrogen oxides, which would appear to ensure a mole ratio of SO_2 to NO_2 of greater than four to one after oxidation.

Regarding the removal of mercury, while Skelley et al. does not specifically teach the removal of mercury, it is known in the art that mercury is present in exhaust gases and because no difference is seen between the process of Skelley et al. and that of the instantly claimed invention, it is expected that at least a portion of the mercury present in the exhaust gas of Skelley et al. will be oxidized and removed.

Claims 2 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skelley et al. in view of Hwang et al. (US 6,136,284).

Skelley et al. is applied above. Skelley et al. does not explicitly teach what type of ozonizer is used to oxidize the sulfur and nitrogen oxides. Hwang et al. teaches a similar process for the removal of these oxides from gas streams. Hwang teaches that the ozonizer may be a corona discharge reactor, which is a type of electrical discharge reactor. It would have been obvious to one of ordinary skill at the time of invention to use the corona discharge ozonizer as the ozonizer in the process of Skelley et al., as it is seen to achieve the desired effect.

Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skelley et al. in view of Hasegawa et al. (US 6,203,598) or alternatively as being unpatentable over Skelley et al. ('737) in view of Skelley et al. (US 4,999,167) and further in view of Hasegawa et al.

Skelley et al. is applied above. Skelley et al. does not explicitly teach that any dust or powder remaining in the gas is removed after the scrubbing step. Skelley does however incorporate the teaching of US 4,999,167, which teaches the removal of particulates after the scrubbing step may be required in certain circumstances where high levels of removal are required (col. 8, lines 25-30).

Hasegawa et al. teaches a similar process for the removal of sulfur oxides from a gas stream by scrubbing with sodium hydroxide. Hasegawa et al. teaches the use of a wet electrostatic precipitator after the absorption (scrubbing) process, in order to collect any dust or particulates remaining in the gas. It would have been obvious to one of ordinary skill at the time of invention to use the wet electrostatic precipitator of Hasegawa et al. in the process of Skelley et al. in order to ensure the removal of any dust or particulates from the vented gases.

Claims 1-2, 7-15, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 5,723,838).

Shin et al. teaches a process for the removal of sulfur oxides and nitrogen oxides from an exhaust gas. The process comprises oxidizing the gases using an electron beam electrical discharge reactor to form higher order oxides of NO_x and SO_x, such as for example converting NO to NO_2. The gases are then sent to a scrubber/absorption chamber where they are contacted with a calcium hydroxide slurry, or scrubbing solution. The scrubbing solution is taught to be more effective if it also contains sodium hydroxide. Finally, the gases are sent through an electrostatic precipitator to remove the alkali salts and aerosols produced from the scrubbing.

While the pH of the scrubbing solution of Shin et al. is not explicitly taught, it is expected that it have a pH of greater than six because it contains calcium hydroxide and sodium hydroxide, which are known to yield solutions of high pH. Where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). Additionally, it would have been obvious to one of ordinary skill at the time of invention to use a sodium hydroxide solution of high pH in order to effectively neutralize the acidic components of the gas.

Regarding claims 9 and 20, it is inherent that the scrubbing slurry contains alkali sulfites and alkali sulfates, as they are known to be produced upon contact with the oxidized sulfur-containing components of the gas.

Regarding claims 7-8, Shin et al. does not explicitly teach the ratio of SO_2 to NO_2 present after oxidation. However, it is expected that the process of Shin et al. may be performed so as to have different oxidizing potentials, i.e. performing oxidation for different lengths of time, and that the gases treated by the process of Shin et al. may vary in their SO_x to NO_x ratios. Therefore, while Shin et al. does not explicitly teach the gas concentrations after the oxidation reaction, where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). Furthermore, it is known that exhaust gas may contain a significantly higher amount of sulfur

oxides than nitrogen oxides, which would appear to ensure a mole ratio of SO_2 to NO_2 of greater than four to one after oxidation.

Regarding the removal of mercury, while Shin et al. does not specifically teach the removal of mercury, it is known in the art that mercury is present in exhaust gases and because no difference is seen between the process of Shin et al. and that of the instantly claimed invention, it is expected that at least a portion of the mercury present in the exhaust gas of Shin et al. will be oxidized and removed.

Regarding claims 11 and 19, while Shin et al. teaches the use of an electrostatic precipitator, it is not explicitly taught that a wet electrostatic precipitator is used after the scrubbing step. However, it would have been obvious to one of ordinary skill at the time of invention to do so, as it known in the art that wet electrostatic precipitators will achieve the desired effects.

Claims 1, 7-10, 12-14, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saxena et al. (US 5,985,223) in view of Skelley et al. (US 5,316,737).

Saxena et al. teaches a process for the removal of sulfur oxides and nitrogen oxides from an exhaust gas. The process comprises oxidizing the gases with ozone to form higher orders of NO_x and SO_x, such as for example converting NO to NO_2. The gases are then sent to a scrubber chamber where they are contacted with a sodium hydroxide solution having a pH of greater than seven. Saxena et al. does not explicitly teach the removal of alkali aerosols generated from the scrubbing step. However, it is well known in the art, see for example Skelley et al., and would

have been obvious to one of ordinary skill at the time of invention to supply a demister to remove any remaining alkali aerosols before venting the treated gases to the atmosphere.

Regarding claims 9 and 20, it is taught that a portion of the scrubbing solution be withdrawn and either replaced with clean solution or removed of impurities (i.e. alkali sulfates and nitrates) and recirculated; therefore it is inherent that the scrubbing solution contains alkali sulfites and alkali sulfates, as they are known to be produced upon contact with the oxidized sulfur-containing components of the gas.

Regarding claims 7-8, Saxena et al. does not explicitly teach the ratio of SO_2 to NO_2 present after oxidation. However, it is expected that the process of Saxena et al. may be performed so as to have different oxidizing potentials, i.e. performing oxidation for different lengths of time, and that the gases treated by the process of Saxena et al. may vary in their SO_x to NO_x ratios. Therefore, while Saxena et al. does not explicitly teach the gas concentrations after the oxidation reaction, where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980). Furthermore, it is known that exhaust gas may contain a significantly higher amount of sulfur oxides than nitrogen oxides, which would appear to ensure a mole ratio of SO_2 to NO_2 of greater than four to one after oxidation.

Regarding the removal of mercury, while Saxena et al. does not specifically teach the removal of mercury, it is known in the art that mercury is present in exhaust gases and because no difference is seen between the process of Saxena et al. and that of the instantly claimed

invention, it is expected that at least a portion of the mercury present in the exhaust gas of Saxena et al. will be oxidized and removed.

Claims 2 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saxena et al. in view of Skelley et al. and further in view of Hwang et al. (US 6,136,284).

Saxena et al. is applied above. Saxena et al. does not explicitly teach what type of ozonizer is used to oxidize the sulfur and nitrogen oxides. Hwang et al. teaches a similar process for the removal of these oxides from gas streams. Hwang teaches that the ozonizer may be a corona discharge reactor, which is a type of electrical discharge reactor. It would have been obvious to one of ordinary skill at the time of invention to use the corona discharge ozonizer as the ozonizer in the process of Saxena et al., as it is seen to achieve the desired effect.

Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saxena et al. in view of Skelley et al. and further taken with Hasegawa et al. (US 6,203,598).

Saxena et al. is applied above. Saxena et al. does not explicitly teach that any dust or powder remaining in the gas is removed after the scrubbing step. Hasegawa et al. teaches a similar process for the removal of sulfur oxides from a gas stream by scrubbing with sodium hydroxide. Hasegawa et al. teaches the use of a wet electrostatic precipitator after the absorption (scrubbing) process, in order to collect any dust or particulates remaining in the gas. It would have been obvious to one of ordinary skill at the time of invention to use the wet electrostatic precipitator of Hasegawa et al. in the process of Saxena et al. in order to ensure the removal of any dust or particulates from the vented gases.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (USPN 5,041,271) taken with Senjo et al. (USPN 4,035,470).

Aoki et al. disclose a process wherein waste gas containing SO_x and NO_x are subjected to oxidation by electron beam irradiation, then reacted with ammonia to form ammonium sulfate and ammonium nitrate. The ammonium sulfate and ammonium nitrate are then removed from the system using an electrostatic precipitator.

Aoki et al. do not explicitly teach that the ammonia be introduced as a scrubbing solution with a specific pH. Senjo et al. disclose a process wherein sulfur oxides and nitrogen oxides are removed from waste gas by oxidizing NO to NO_2 and then scrubbing the gas with an aqueous scrubbing solution containing ammonium sulfite in order to produce ammonium sulfate and ammonium nitrate. The pH of the scrubbing solution is preferably in the range from 6.5 to 8.5 (column 4, lines 39-45). It would have been obvious to one of ordinary skill at the time of invention to use a scrubbing solution containing ammonia to react with the acid components of the waste gas, as taught by Aoki et al. at a pH of between 6.5-8.5 to react with the NO_2 and SO_2 components, as taught by Senjo et al in the process of Aoki et al. in order to ensure a more complete removal of the gaseous pollutants. It is noted that the scrubbing solution will also contain ammonium sulfate, as it is the product of both the reaction of ammonia with the acid components and of ammonium sulfite with the NO_2 and SO_2 components.

Aoki et al. do not disclose that Hg present in the waste gas may be treated by the system. However, no difference is seen between the process of Aoki taken with Senjo and that of the instantly claimed invention that would prevent the process of Aoki and Senjo from removing

mercury impurities, which are known to be present in combustion, exhaust gases. It is thereby expected that the process of Aoki and Senjo oxidizes and removes Hg as well as SO_x and NO_x.

Allowable Subject Matter

Claims 3-6 and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J. Lish whose telephone number is 571-272-1354. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PL

STEVEN BOS
PRIMARY EXAMINER
GROUP 1100